Mladen Jurak
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Department of Mathematics
University of Zagreb
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CURRICULUM VITAE

EDUCATION AND ACADEMIC TITLES

1988 – 1993	Ph.D. in Applied Mathematics University of Zagreb, Croatia Ph.D. thesis: *Capillary oscillations of an Euler fluid in a porous reservoir* Advisors: I. Aganović and Z. Tutek.
1985 – 1988	Postgraduate study in Applied Mathematics University of Zagreb, Croatia M.Sc. thesis: *A one-dimensional model of composite rod* Advisor: Z. Tutek.
1981 – 1985	Graduate study of Mathematics, University of Zagreb, Croatia Diploma thesis: *Eliptic-eliptic stiff problems* Advisor: I. Aganović.

ACADEMIC POSITIONS

Current	Associate Professor Faculty of Science, Department of Mathematics University of Zagreb, Croatia
1995 – 2001	Assistant Professor Faculty of Science, Department of Mathematics University of Zagreb, Croatia
Sept. 1997 – Sept. 1998	Postdoctoral Fellowship Elf Aquitaine Pau and University of St–Etienne, France *Scaling-up of two phase flow in porous media with change of capillary pressure curves and of relative permeability curves* Advisor: A. Bourgeat
1985 – 1995	Teaching and Research Assistant Faculty of Science, Department of Mathematics University of Zagreb, Croatia.

RESEARCH INTERESTS

- Mathematical modelling, analysis, upscaling and simulation of multiphase flow in porous media.
- Mathematical homogenization and upscaling; calculation of effective properties of heterogeneous materials; homogenization of convection-diffusion problems and calculation of hydrodynamic dispersion; upscaling of multiphase flow through porous media.
- Finite element method and finite volume methods, object oriented finite element/volume code construction.
- Lower-dimensional models in elasticity, their justification from three-dimensional theory and numerical calculation.

SCIENTIFIC PUBLICATIONS

1. B. Amaziane, M. Jurak, A. Žgaljić Keko. *Modeling and Numerical Simulations of Immiscible Compressible Two-Phase Flow in Porous Media by the Concept of Global Pressure.* Transport in Porous Media (2009) DOI: 10.1007/s11242-009-9489-8.
2. A. Bourgeat, M. Jurak. *Scaling-up the two-phase flow in porous media: comparison of methods.* Computat Geosci 14, No 1 (2010) 1–14.
3. A. Bourgeat, M. Jurak, F. Smaï. *Two-phase, partially miscible flow and transport modeling in porous media; application to gas migration in a nuclear waste repository.* Computat Geosci 13, No 1 (2009) 23–42.
4. B. Amaziane, M. Jurak. *A new formulation of immiscible compressible two-phase flow in porous media.* C. R. Méchaniques 336 (2008) 600–605.
5. B. Amaziane, A. Bourgeat, M. Jurak. *Effective Macrodiffusion in Solute Transport Through Heterogeneous Porous Media.* Multiscale Model. Simul. 5 (2006) 184–204.
6. A. Bourgeat, M. Jurak, A. Piatnitski. *Averaging a transport equation with small diffusion and oscillating velocity.* Math. Models Methods Appl. Sci. 26 (2003) 95–117.
7. M. Jurak, J. Tambača. *Linear Curved Rod Model. General Curve.* Math. Models Methods Appl. Sci. 11 (2001) 1237–1252.
8. M. Jurak, J. Tambača. *Derivation and justification of a curved rod model.* Math. Models Methods Appl. Sci. 9 (1999) 991–1014.

9. M. Jurak, Z. Tutek. *Wrinkled Rod.* Math. Models Methods Appl. Sci. 9 (1999) 665–692.

10. M. Jurak, J. Tambača, Z. Tutek. *Derivation of a Curved Rod Model by Kirchhoff Assumptions.* Z. Angew. Math. Mech. 79 (1999) 455–463.

11. I. Aganović, M. Jurak, E. Marušić–Paloka, Z. Tutek. *Moderately wrinkled plate.* Asymptotic Anal. 16 (1998) 273–297.

12. M. Jurak. *Homogenization of capillary oscillations of an inviscid fluid in a porous reservoir.* Bolletino U. M. I. 7 (1996) 67–97.

13. M. Jurak. *On the limit behavior of the solutions of a sequence of generalized eigenproblems in different Hilbert spaces.* Glasnik Matematički 29 (1994) 79–95.

14. M. Jurak, Z. Tutek. *A one-dimensional model of homogenized rod.* Glasnik Matematički 24 (1989) 271–290.

PUBLICATIONS IN CONFERENCE PROCEEDINGS

1. B. Amaziane, M. Jurak, A. Žgaljić Keko. *Modeling and numerical simulations of water-gas flow in porous media using the concept of global pressure.* Proceedings of the 3rd International Conference on Approximation Methods and Numerical Modelling in Enviroment and Natural Resources, Pau, France, B. Amaziane et al. (eds.), Vol. 1, (2009), 115–120.

2. B. Amaziane, A. Bourgeat, M. El Ossmani, M. Jurak, J. Koebbe. *Homogenizer++: A Platform for Upscaling Multiphase Flows in Heterogeneous Porous Media.* Monografías del Seminario Matemático García de Galdeano 33 (2006), 395-402.

3. M. Jurak, Ž. Prnić. *Heating of oil well by hot water circulation.* Proceedings of the Conference on Applied Mathematics and Scientific Computing, Z. Drmač, et. al. (eds.), Springer-Verlag (2003), 235–244.

4. M. Jurak, J. Tambača, Z. Tutek. *Modelling of curved rods.* Applied Mathematics and Scientific Computing, Z. Drmač et al. (eds.), Kluwer Academic (2003), 91–121.

5. M. Jurak. *Upscaling of Two-Phase Flow.* Proceedings of the Conference on Applied Mathematics and Computation, Dubrovnik, M. Rogina et al. (eds.), (2001).

6. I. Aganović, M. Jurak, E. Marušić-Paloka, Z. Tutek: *A Model of Wrinkled Plate*, ZAMM 76 (1996) S2, pp. 457-458.

7. M. Jurak, Z. Tutek: *Model of Wrinkled Rod*, ZAMM 77 (1997) S2, pp. 583-584.

TECHNICAL REPORTS

- A. Bourgeat, M. Jurak. *Changement d'Echelle pour les Caractéristiques Physiques de Gisement (Pression Capillaire, Perméabilités Relatives et Absloues et Porosité).* Rapport Interne Elf Aquitaine (1998).

CONFERENCE TALKS

1. *Formulation of Compressible Immiscible Two-Phase Flow Model by Means of Global pressure.* SIAM Conference on Mathematical & Computational Issues in the Geosciences, Jun. 15 – 18, 2009, Leipzig, Germany.

2. *Modeling and Numerical Simulations of Water-Gas Flow in Porous Media using the Concept of Global Pressure.* International Conference on Approximation Methods and numerical Modeling in Environment and Natural Resources. Jun. 8 – 11, 2009, Pau, France.

3. *A New Formulation of Immiscible Compressible Two-Phase Flow in Porous Media Via the Concept of Global Pressure.* Scaling up and modelling for transport and flow in porous media, Oct. 13 – 16, 2008, Dubrovnik, Croatia.

4. *Effective transport of solute in heterogeneous porous media.* Conference on Applied Mathematics and Scientific Computing, Jun. 19 – 24, 2005, Brijuni, Croatia.

5. *Heating of oil well by hot water circulation.* Conference on Applied Mathematics and Scientific Computing, Jun. 23 – 27, 2003, Brijuni, Croatia.

6. *Averaging singularly perturbed convection-diffusion equation with non periodic velocity.* Conference on Applied Mathematics and Scientific Computing, Jun. 4 – 9, 2001, Dubrovnik, Croatia.

7. *Upscaling of Convection-Diffusion Equation. One-Dimensional Case.* International Conference on Computer Methods in Porous Media, Jul. 10 – 13, 2000, Besançon, France.

8. *Upscaling of two-phase flow.* Conference on Applied Mathematics and Computation, Sep. 13 – 18, 1999, Dubrovnik, Croatia.

9. *Scaling up two-phase flow in porous media: comparison of methods.* International Congress on Industrial and Applied Mathematics, Jul. 5 – 9, 1999, Edinburgh, Scotland.

10. *Homogenization of a plane elastic arch.* Croatian Congress of Mathematics, Jul. 18 – 20, 1996, Zagreb, Croatia.

11. *Model of wrinkled rod.* Gesellschaft für Angewandte Mathematik und Mechanik, May 27 – 31, 1996, Prag, Czech Republic.

12. *Homogenization in Elasticity Theory.* Advanced Topics in Applied Mathematics, Oct. 1 – 15, 1987, Dubrovnik, Croatia.

SEMINAR TALKS

1. *Upscaling of water-gas flow with mass exchange.* Modélisation Numérique d'Écoulements Multiphasiques en Milieux Poreux GdR-CNRS MoMaS, Oct. 9, 2006, Pau, France.

2. *Dispersion in periodic porous media.* Homogénéisation numérique en milieux poreux, GdR-CNRS MoMaS, Dec. 12, 2003, Pau, France.

3. *Changement d'échelle dans écoulement diphasique.* XII journée des thésards en Mathématiques Appliquées, Oct. 13 – 14, 1999, Cannes, France.

4. *Homogenization of linear shallow water flow.* olloque Structures reticulees, Nov. 7 – 9, 1994, Aussois, France.

SUMMER SCHOOL LECTURES

- *Upscaling of the two-phase flow from meso-scale to macro-scale.*
  Écoles CEA-EDF-INRIA Modèles mathématiques et méthodes numériques pour les écoulements non saturś en milieu poreux. Applications à l'environnement, Sept. 12 – 15, 2005, INRIA - Rocquencourt, France.

TRAINING

Sep. 17 – 22, 1997	*Eclipse 100 User Course*, GeoQuest Training Center, Orpington, United Kingdom
Mar. 12 – 18, 1995	*Composite Materials and Homogenization*, Oberwolfach, Germany.
Jan. 15 – 26, 1990	*Workshop on Composite Media and Homogenization Theory*, Trieste, Italy.

RESEARCH VISITS

Nov. 1 – Dec. 1, 2009	Depart. of Mathematics, University of Pau, France.
Sep. 1 – 12, 2008	Depart. of Mathematics, University of Pau, France.
Jun. 1 – 30, 2008	Depart. of Mathematics, University of Pau, France, (Visiting Professor).
Nov. 25 – Dec. 15, 2007	Depart. of Mathematics, University Lyon 1, France.
Sep. 1 – 30, 2007	Depart. of Mathematics, University of Pau, France, (Visiting Professor).
Jun. 18 – 30, 2007	Depart. of Mathematics, University of Pau, France.
Oct. 1 – 15, 2006	Depart. of Mathematics, University of Pau, and University Lyon 1, France.
Jun. 1 – 30, 2006 Dec. 6 – 20, 2005	Depart. of Mathematics, University of Pau, France. University Lyon 1, France.
Nov. 12 – Dec. 12, 2004	Depart. of Mathematics, University of Pau, France, (Visiting Professor).
Nov. 24 – Dec. 19, 2003	University Lyon 1, France.
Jun. 1 – 30, 2003	Depart. of Mathematics, University of Pau, France, (Visiting Professor).
Dec. 6 2002– Jan. 17 2003	Depart. of Mathematics, University of Pau, France.
Jun. 3 – 14, 2002	University Lyon 1, France.
Jul. 26 – Aug. 10, 2001	University of Marseille, France. *Centre International de Rencontres Mathématiques*
May 15 – Jun. 4, 1999	Faculty of Sciences, University of St-Etienne, France.

ORGANIZED EVENTS

- *Conference on Scaling Up for Modeling Transport and Flow in Porous Media*, Dubrovnik, Croatia, 13-16 October, 2008.

RESEARCH PROJECTS

2006 – 2009	principal investigator *Numerical modelling of fluid flow through porous media*, financed by Ministry of Science, Education and Sports, Croatia.
2002 – 2006	principal investigator *Effective parameters in mathematical reservoir models*, financed by Ministry of Science, Education and Sports, Croatia.
1996 – 2002	research associate (principal investigator I. Aganović) *Matematical analysis of composite thin structures*, financed by Ministry of Science, Education and Sports, Croatia.

OTHER SCIENTIFIC ACTIVITIES

- Guest editor in Applicable Analysis journal, Volume 88, Issue 10 – 11.

STUDENT ADVISING

- 10 Diploma thesis, Depart. of Mathematics, Univ. of Zagreb, Croatia
- 2 M. Sc. thesis, Depart. of Mathematics, Univ. of Zagreb, Croatia
- Ph.D. students: Ana Žgaljić Keko (2005 – present), Anja Vrbaški (2006 – present), Depart. of Mathematics, Univ. of Zagreb, Croatia

TEACHING EXPERIENCE

- Lecture courses: Calculus, Analytical Mechanics, Partial Differential Equations, Numerical Mathematics, Numerical Methods in Applied Mathematics, Numerical Methods for PDE, Finite Element Method, Programming Language C, Programming Language Java, Programming Language C++, Mathematical Modeling of Transport through Porous Media.

Faculty of Science, Depart. of Mathematics, Univ. of Zagreb, Croatia
Faculty of Electrical Engineering and Computing, Univ. of Zagreb, Croatia

MEMBERSHIPS

- Society of Industrial and Applied Mathematics

COMPUTER SKILLS

- Operating systems: Linux/UNIX, DOS/Windows.
- Programming languages: Java, C++, C, FORTRAN 90, FORTRAN 77.
- Other software: Mathematica, Scilab, Matlab, Deal-ii, Libmesh, FreeFem++, Eclipse (Schlumberger).

LANGUAGES

- fluent in Croatian, English and French, basics of Russian.

Zagreb, 12. November, 2009. Dr. Mladen Jurak